TINKER & RASOR
1948 60 YEARS OF QUALITY 2008

PRODUCT INSTRUCTIONS

MODEL MARK V RANGER

FIVE SECTIONS of QUICK INFORMATION

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OPERATING INFORMATION

I. Model Mark V Ranger - Audio Frequency

A. Pearson Type Holiday Detector

The Tinker & Rasor Mark V Ranger set on audio frequency position was designed to locate discontinuities, flaws or breaks in the coating of buried pipelines. This method makes possible the exact location of coating breaks in buried lines without access to the surface of the coated pipe. Locating electrical discontinuities aids in evaluating the application of a coating and also these can be repaired to eliminate corrosion and to reduce the amount of current required for cathodic protection.

B. Short Locator

The apparatus is also effective in locating shorts or undesirable electrical contacts to a buried coated pipe. Such electrical contacts should be removed prior to placing a pipeline under cathodic protection, as these contacts would drain a large amount of protective potential from the coated pipe.

C. Pipe Locator

The apparatus can be used very effectively as a pipe locator on coated pipelines which are electrically connected by screw or welded joints. This applications is particularly effective where it is desired to locate and follow one pipeline along a right-of-way where there are a number of buried lines.

II. Operating Methods

A. Pearson Survey Method

The method used to locate discontinuities is that of applying audio-frequency AC energy between the coated pipe and ground. A traverse along the pipeline is made in which the difference in

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potential is indicated across approximately twenty to thirty feet of soil above the line. This potential difference is noted in the receiver. When an area is reached where the difference in potential is considerably greater than the average potential over the pipe, a discontinuity is assumed to lie under this area.

B. Method of Locating Shorts

The method of locating shorts or contacts on a coated pipe is that of applying AC audio-frequency energy between the pipe and a remote ground connection. A traverse is made along the pipeline with a receiver equipped with a search coil. A short or contact is observed along the traverse where the average AC signal picked up over the line suddenly drops to a very low level. This is assumed to be a point directly above the contact.

C. Method of Locating Pipe

An audio-frequency AC signal is placed between the coated pipe and a good ground connection. The receiver, containing a search coil, is passed over the area where the pipe is assumed to be located. As the receiver is moved back and forth in a horizontal plane over the pipe, a sharp null will occur in the received signal. The pipe to be located is assumed to be directly under this null. A well coated pipeline can be followed for a great distance by this method.

III. Apparatus

The complete apparatus furnished with the Mark V Ranger Detector comprises the following:

A. Receiver with battery*
B. Transmitter with battery*
C. Headphones, Stereo
D. Shoe Cleats
E. Connecting Cables
F. Terminal Boards
G. Carrying Case

*Note: Li-Ion battery may be purchased as an optional accessory.

The Transmitter/Oscillator set on the audio-frequency position has been designed to use the latest developments in this type of instrumentation. A digitally synthesized circuit, the Transmitter/Oscillator converts low voltage DC to stable audio frequency AC directly by a highly efficient method.

A. Transmitter/Oscillator

In order that a maximum of energy can be transferred from the Transmitter/Oscillator to the pipe, the output of the Transmitter/Oscillator is provided with automatic impedance match to the load. An interrupter is provided to make the signal more easily recognized. The interrupter is actuated by turning the Conductive/Inductive switch to the pulse position on the Transmitter/Oscillator.

B. Receiver

The Receiver employs a high gain amplifier and sharply tuned 750-cycle filter. Modern circuit design insures maximum circuit stability even when operated at ambient temperature extremes. The filter attenuates AC power line and other interferences, permitting operation in the vicinity of high-tension lines. A loudspeaker, with a volume control is built into the Receiver.

Plugging headphones into the jack marked PHONES disables the loudspeaker. Plugging the cables from the cleat terminal board into the jack marked INPUT automatically disconnects the search coil and connects the cleats to the amplifier. The meter gives a visual indication of signal intensity and also serves to check the battery condition. To test the battery, turn the Gain Switch to test and turn the Receiver on. Replace battery if necessary.

C. Shoe Cleats

The shoe cleats provided with the detector have been designed for maximum foot comfort and for the most effective ground contact.

D. Connecting Cables

All necessary connecting cables are furnished. Terminal Boards with belt loops are furnished to provide a convenient means of making the necessary connections between shoe cleats and the Receiver.

IV. Instructions for Unpacking and Inspection

Note the placement of the various components as received and repack in the same manner when not in use. If damage has occurred in shipment, file a claim with the carrier immediately. If it is necessary to contact your supplier or the manufacturer concerning damaged or missing items, be sure to include all the information such as serial numbers, purchase order number and invoice number. This will assure you of obtaining proper and expeditious service.

V. Operating Instructions

A. Pearson Survey

The following components are required for a Pearson Survey of a buried pipeline:

A. Transmitter/Oscillator
B. Receiver
C. Connecting Cables & Terminal Boards
D. Two sets of Shoe Cleats
E. Cleat Connecting Cables
F. 25 Watt Oscillator (optional accessory, not required under normal conditions).
G. Twelve-volt storage battery (not furnished, for use with optional oscillator).

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The Transmitter/Oscillator set on the audio-frequency position is placed along the pipeline at a point where an electrical connection can be made to the pipe. Test point lead wires are convenient connections. Plug the Pipe and Ground Terminal Board into the jack marked OUTPUT . The pipe lead wire is connected to the terminal marked PIPE. Connect the groundwire to the terminal marked GROUND and then to some metal structure which is in good electrical contact with the earth. If no structure is available, a ground rod can be driven into the earth and an electrical connection made to it.

If the optional 25-watt Oscillator is used, connect a 12-volt storage battery to the battery terminals, observing correct polarity. (RED is POSITIVE, BLACK is NEGATIVE). Turn the battery switch to "ON". the output indicator should glow.

The terminal boards should be attached to the belts of the operators. The board with the cord and plug is used by the operator who carries the Receiver. Both operators fasten cleats on their shoes, then attach cleat cables to each cleat, running the cable inside their pant legs. The key operator connects the wires from BOTH of his cleats to the LOWER terminal on his terminal board. The secondary operator connects the wires from both his cleats and one end of the long connecting cable to his terminal board. The other end of the connecting cable goes to the UPPER terminal of the key man's terminal board. The plug coming from the key man's terminal board is plugged into the jack marked OUTPUT on the Receiver. Set the Receiver to the audio-frequency position and turn the unit "ON". The apparatus is ready for use.

The traverse along the pipeline is made by walking over the pipe at a slow pace. Beginning adjacent to the Transmitter/Oscillator set the Receiver sensitivity so that the signal from the Transmitter/Oscillator can be heard at a very lower level. As progress away from the Transmitter/Oscillator is made, the signal may drop and the level can be raised again by increasing the sensitivity control. As the distance increases from the Transmitter/Oscillator, increase the Gain Switch to medium or high as required. A discontinuity is indicated by an INCREASE in average signal level, followed by a relatively sharp decrease, then another increase and then back to normal level as progress is made over the discontinuity.

The exact point of discontinuity lies under the point of decreased signal or null. This, then, is the point halfway between the two operators. If a series of discontinuities exist in close proximity to each other, the null effect may not be heard, or very difficult to observe. In this case, one man walks along the line and the other walks at right angles to the line and discontinuity is noted by an INCREASE in signal directly over the fault.

B. Locating Shorts or Contacts

The following components are required for locating line shorts:

A. Transmitter/Oscillator and Receiver
B. Terminal Board, Pipe and Ground
C. Transmitter to Pipe Cable
D. Ground Cable

The Transmitter/Oscillator and ground connections are made in the same manner as described in the PEARSON SURVEY above.

Turn on the Transmitter/Oscillator and the Receiver making sure that both are set on the audio-frequency position. Advance the Receiver sensitivity control until the 750-cycle tone is heard in the loudspeaker and

the signal intensity meter reads slightly less than full scale. As the Receiver is moved back and forth across the pipe to which the Transmitter/Oscillator is connected, a very sharp decrease, or null, in the received signal will be observed when the Receiver is directly over the pipe. Using this null method, it is possible to trace the path of the pipeline as long as there is a relatively large amount of audio frequency flowing in it. If the coated pipe is in contact with a foreign system, the audio-current will leave the coated pipe at this point and audio-current will flow in the foreign systems. The same null effect will then be present on the foreign system as on the coated pipe from audio Transmitter/Oscillator to point of contact.

C. Locating Pipelines

The apparatus and method required for locating welded or screwed pipe is the same as for locating shorts or contacts. After connecting the Transmitter/Oscillator, hold the Receiver level over the ground and note the intensity of the received signal. As the Receiver is brought near the pipe, the signal will gradually increase and then will null sharply as the Receiver passes directly over the pipe.

It is also possible to determine the depth of a pipe. First mark its exact center, using the method described above. Once the centering of the pipe has been accomplished, it is relatively easy to measure the depth by triangulation. In order to determine the depths of pipes, it is necessary to position the Receiver in a 45-degree angle to the ground surface. This is accomplished by holding the Receiver so that its longest axis is perpendicular to the path of the pipe and then tilting it back until the air bubble in the DEPTH ANGLE gauge lies between the outer edge of the center ring and black border.

Starting at the point directly above the pipe center line, and keeping the Receiver as close to the surface as possible without scratching it on the ground, move slowly away from the pipe at a right angle, maintaining the Receiver at a 45 degree. When a new null or minimum signal is obtained, the depth of the pipe below the surface is the same as the distance between the centerline of the pipe and the leading edge of the Receiver.

REFER TO THE DETECTRON MODEL 505 "GO-FER" PIPE AND CABLE LOCATOR INSTRUCTION MANUAL, FOR RADIO FREQUENCY OPERATION.

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